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ABSTRACT

This publication discusses how the open-space school can facilitate the development and utilization of science learning units. The following three concepts are presented to establish a basis for this discussion: (1) the open classroom, (2) the open-space school, and (3) the learning center. An attempt is made to convey an operational definition of a science learning center by means of a description of its structure. The functions of the science learning center, nature of its materials, student activities and the major contributions that an open-space facility can make to facilitate science learning centers are also discussed. (HM)

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THE OPEN SPACE SCHOOL -- A FACILITATOR OF SCIENCE LEARNING CENTERS

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The Open-Space School -- A Facilitator of Science Learning Centers

During the past decade, learning centers have become increasingly popular as the concept of the "open" classroom has gained momentum. Learning centers have provided an alternative instructional mode that has allowed for greater active student involvement with a concomitant teacher withdrawal from "stage-center." An additional stimulus for the learning center concept has been the design and construction of open-space schools.

Before entering upon a discussion of the merits and interrelationships of these innovations, it might be well to briefly define or describe our terminology so as to establish a basis from which to operate. Three innovations are considered herein: (1) the open classroom; (2) the open-space school; and (3) the learning center. In considering these, one requires a reference point. This criterion reference, as one might call it, is usually referred to as the "traditional" classroom setting. I hesitate to use the term "traditional," because while we all have some basic concept of what is meant by this term, it is, nonetheless, difficult to describe with any degree of precision. One is reminded somewhat of the "normal cow" referred to in many agricultural bulletins, or perhaps familiar to more of us, the "average" person, or family, that in reality does not exist, but which, nevertheless, serves as a standard for comparison purposes. Barbara Blitz in "the open classroom: making it work," describes the traditional situation thus:

> Thirty to forty children of the same chronological age are gathered in one room with one teacher. They have identical lessons, read the same books, solve standardized problems. At intervals, they are tested and evaluated. Progress reports are given to parents and individual children begin to be known as either good or poor students.[1]

[1]Barbara Blitz. The open classroom: making it work. Boston: Allyn and Bacon, Inc., 1970, p. 2.

One might add that the classroom is usually rectangular with the seats arranged in neat rows. The front of the classroom has a large chalkboard extending for most of the room's width, and a teacher's desk facing the students. Furthermore, we envision a rigid class schedule in which the daily routine rarely varies throughout the school term -- except perhaps come time to practice for the annual Christmas program.

We recognize, of course, that this stereotype does not really exist exactly so (or does it?), but we all seem to relate these characteristics to the classroom in which we found ourselves, and so it becomes the "traditional."

Against this, we contrast the "open" classroom. Again, from Barbara Blitz, this time describing the "basic needs" of children that she feels are met by the open classroom:

> Most would agree that 1. children should have the right to pursue individual interests and activities; 2. that they need to be actively engaged with their environment and other people in order for meaningful learning to occur; 3. that the environment is of major importance in structuring the learning of the child; 4. that children learn at their own pace and with their own particular learning styles; 5. that learning should be exciting and enjoyable; and 6. that the teacher's role should be that of diagnostician, guide and stimulation.[2]

She continues that:

> ...other ingredients may be quite variable, depending upon the philosophy and personality of the teacher and upon the available facilities.[3]
>
> Whatever the particular outward form of the open classroom, the essential thought behind it is that children are unique, physically active individuals, and that their learning needs can only be met in a free,

[2] Ibid., p. 3.

[3] Ibid., pp. 3-4.

> active atmosphere which tailors the learning environment to the specific needs and abilities of each child.[4]

The open classroom concept can perhaps best be thought of as a philosophy, an attitude. It requires no special facilities, no special architectural designs. It is a matter of what might be termed a student-centered classroom, rather than a teacher-centered classroom. It revives thoughts about Margaret Naumberg's "child-centered" philosophy of education. The open classroom concept is a philosophical concept rather than a physical concept. It concerns itself with attitudes about children, teachers, and approaches to learning, rather than with the physical structure of the school building.

For the open classroom to flourish, however, there are certain obvious physical changes within the classroom that need to be made to facilitate the philosophy. These range from furniture selection and arrangement to a re-structuring of the curriculum. It is not the intent of this article to elaborate on these factors; there are already many articles and books, to which the reader may refer, that describe the classroom and curriculum structure of the open classroom philosophy.

One innovation that plays a key role in this philosophy is the learning center, especially, the activity-oriented learning center. Learning centers are currently a very popular mode of instruction in the elementary school. Unfortunately, in the mad rush to participate in this innovation, many teachers have latched onto the term, but not the idea. Consequently, many "centers" are nothing more than bulletin board displays. This is not to insinuate that there is no value to such displays, but it is this writer's opinion that these do not constitute "learning centers" in the usually ac-

[4]Ibid., p. 4.

cepted sense of the term. Neither does he wish to imply that a bulletin board display cannot be a part of the structure of a learning center.

Since there are certainly many forms that learning centers have taken in actual use, and various interpretations of learning centers in existence, for the purpose of this article, an attempt will be made to convey an operational definition of a science learning center by means of a description of its structure.

First, a science learning center should be a student activity-oriented center. Note the emphasis on two terms: student and activity. Too often, and for many reasons (some self-serving), teachers do not allow students to become physically involved in the manipulation of the "things of science." There are many good reasons for the use of teacher-demonstrations, but there is no substitute for the direct physical involvement of children. This is especially true during the early childhood period (preoperational and concrete operational stages) of formal education, but it continues also in the formal operations stage whenever a student is faced with a new or complex problem that is difficult to conceptualize without reference to a concrete representation. Physical involvement stimulates and assists mental involvement. It is motivational, but even more importantly, it facilitates conceptualization. The child needs to "act on" his environment in order to understand it. In his summation of Piaget's genetic theory, Wolff notes that Piaget believes: "...motor action is the source from which mental operations emerge (i.e., thought arises from sensori-motor activity); that man's knowledge about the world derives from the concrete experiences with it."[5] The idea of children's manipulation of science materials as an im-

[5]P. H. Wolff. "The development of Jean Piaget and psychoanalysis." Psychological Issues 2(1): Monograph 5; 1960.

portant part of learning has become well accepted during the past decade. For a science learning center to make an optimal contribution in the instructional strategy, it should include a substantial array of activities that call for the active psychomotor involvement of students, in addition to cognitive involvement.

The science learning center can have three basic functions: (1) it can be the focus of the learning strategy; (2) it can contain reinforcement and/or remediation activities; or (3) it can be an enrichment center. The nature of the materials in the center, their scope and sequence, will be determined by the primary function of the center as envisioned by the teacher. As a reinforcement or a remediation center, it should focus on specific skills or concepts. In the case of reinforcement, the activities should not be a repeat of those already used in the primary teaching strategy, but rather, parallel activities; those requiring similar psychomotor skills and thought processes, which tend to strengthen the patterns established in the original lesson. For remediation purposes, care must be taken to properly identify those specific skills that the student failed to master and carefully select activities which, while attempting to develop the same skill as with the original strategy, will utilize a different approach. Little is gained in simply repeating the same activity, the same approach, since the nature of the activity or the teaching strategy may have been the problem to begin with. Access to the center may be provided whenever the child has some free moments. Such time must obviously be provided prior to embarking on a new lesson predicated on a mastery of the skills and/or concepts of the current lesson.

Enrichment centers can provide purposeful learning opportunities for those children capable of quickly mastering the basic skills and concepts.

It is often more desirable to provide enrichment for these children than to embark on new topics. Acceleration may produce peer group problems, as well as a tendency toward superficiality of understanding by the student. Many science curriculum projects provide superb enrichment activities that can be utilized in a learning center format. Interdisciplinary activities will also serve as excellent enrichment opportunities.

When the major teaching strategy utilizes the learning center approach, the problems of sequencing instruction loom of great importance. Since the learning center concept assumes a maximum of student involvement, independent study, and a minimum of direct teacher involvement, except in the center's development and student assessment, selection and sequencing of instructional materials is not unlike that involved in the creation of programmed instructional materials. Concept and skill analysis techniques must be employed by the teacher to insure the hierarchical organization of psychomotor and cognitive skills, the hierarchical arrangement of concepts, and the proper integration of skills and concepts.

Since the design of science learning centers is not within the scope of this article, I will not delve any further into the endeavor at this time. Reference to the intent and structure of such centers was made as a background to the theme of this article, the open-space school as a facilitator of science learning centers.

Earlier, the concept of the "open classroom" was briefly discussed. It was stated that this concept was basically one of philosophy or attitude focused on a student-centered versus a teacher-centered orientation; perhaps somewhat roughly, democratic versus authoritarian. It was described as being independent of the physical structure of the school building.

The open-space school is concerned with the physical structure of the school facility; the idea of classrooms without walls. Its design may be as varied as the architect's imagination. Basically, it consists of multi-classroom size areas interconnected with each other and common facilities (administrative and/or counselor offices, media center, cafeteria, special purpose or multipurpose room, etc.). The basic purpose of such a design is to decrease the restrictive and confining sensation associated with the traditional school structure of immoveable walls surrounding each group of students customarily referred to as a class.

One constraint on center development is, quite often, the physical space limitation. In a "traditional facility" space is generally limited, since the room design envisioned well-arranged student desks, a teacher's desk, hopefully one modest-sized table in one corner of the room, and perhaps even a fixed counter or bookshelf along the window ledge. A substantial amount of space is devoted to hallways in traditionally designed schools. If this space could be incorporated into the adjoining classrooms, a significant amount of space would become available to each teacher. It is perhaps safe to say, however, that part of the extra space available in the open-space architectural design is accounted for by a higher space per student ratio in many new structures than was the case with older facilities. Nevertheless, space/student ratio and the incorporation of hallway space aside, the ability to "juggle" space requirements in the absence of restrictive walls is a significant aid in the establishment of activity-oriented learning centers.

With fixed walls, it is impossible to "borrow" a few square feet of space from adjoining areas. A certain amount of space is required for

students' desks, or suitable writing surfaces, and so the teacher finds it impossible to add the necessary tables and work space (including "moving-around" space or elbowroom) required for the physical lay-out of any activity-based learning center.

Physically, then, the open-space design allows for greater flexibility of furniture arrangement, thus affording opportunities for grouping, clustering, centerizing -- in other words, convergent and divergent student and facility arrangements. Greater flexibility is the net result.

If this had been the only intent, however, architects could have achieved some of these same benefits by merely enlarging each classroom within a traditional design. The open-space facility also offers instructional and organizational flexibility. As examples, it facilitates teaming by teachers, cross-grouping of students, semi-departmentalization in certain subject areas, large group-small group instructional procedures, cross-grade grouping, and, it can be used more effectively for ungraded school organization. The opportunities are limited only by the imagination and cooperation of the staff.

Let us now look specifically at the open-space school/science learning center relationship.

With space flexibility now available, work tables can be set up on which the necessary materials and supplies for student inquiry can be placed for convenient student utilization. Proper tabletop space can be provided for student manipulation of the necessary materials in a true inquiry process. The center can be accessible to students for formal "science time" without the need for hauling out materials before and putting everything away after the science lesson. Furthermore, the center can remain available for ad-

ditional time for some students for enrichment, reinforcement, and/or remediation activities.

For those teachers who prefer unstructured time for science, the center in an open-space facility provides the same advantage, but in addition, there is a greater possibility of placing it so that student activities will not distract other students not working in the center. The noise created by physical activity with the "things" of science, plus small group discussion and excitement, can be disruptive to students engaged in "quiet" activities. Traffic to and from the center area can also be less of a problem in the open-space facility.

Up to this point, we have not as yet discussed the major contributions an open-space facility can make to facilitate science learning centers. One of these is in conjunction with team teaching. Wherever and whenever two or more teachers coordinate their programs, combine their students either in large-group or small-group instruction, "exchange" students for certain subject matter instruction, or engage in any other form of team effort, fixed classroom walls have always presented a problem. Generally, teachers find it more convenient to "go it alone" than to face the problems of shifting students from room to room. This, combined with space limitations, may result in the exclusion of science learning centers, or their reduction to small "show-and-tell" areas. The open-space facility will allow for the development of one center to serve all of the participating teachers and their students. The center can be jointly constructed and alternately manned by the teachers, or it can be constructed and manned by one of the teachers with special interest and background in science. Because of its joint utilization by two or more teachers, there can be less competition for the usually somewhat meager science resources and equipment.

Access to such a center is of little problem. Students can come and go individually or in small groups without undue disruption of other students. The center can be located wherever it is most convenient for access by all students and/or supervision by the teachers. Whereas the structurally self-contained classroom facility often limits the number of learning centers to one at a time and even then severely limits its size, the open-space facility combined with the team-center concept can allow for the development and functioning of several content area centers simultaneously. Since each center is shared by two or more classes, its size and scope can usually be expanded considerably.

The architectural design of open-space schools varies considerably. In some, there are multiple "pods," each housing one grade level. In such cases a single science-learning center may serve an entire grade. Access to the center is again facilitated by the absence of walls separating the "classrooms." As in the case of small teams, the center can be developed and managed jointly by the teachers, or, and in this case more likely, by a teacher with specific interests in science. Other content area centers can also be established to serve the entire grade. By careful development of the instructional package, the learning centers can serve a wide range of ability and interest levels. The open-space, team-oriented center structure eliminates some of the problems associated with departmentalization at the elementary school level, yet can capitalize on its strength.

In recent years, the ungraded school philosophy has received considerable attention. Coupled with the open-space structure, multi-level science learning centers can be constructed to serve a wide range of student interest, ability, and level of achievement.

While the open-space school is by no means a panacea for our educational problems, it can be seen that the flexibility offered by this mode of construction can facilitate the develcpment and utilization of science learning centers. Its physical location, its size and scope, can be governed more by the changing needs of the science center in relation to other curriculum areas than by the constraints imposed by walls.